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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/783,094

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Nobuko Watanabe

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EXAMINER

UHLENHAKE, JASON S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 01/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/783,094	Applicant(s) WATANABE ET AL.	
	Examiner Jason Uhlenhake	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 5, 11, 12, 13, 14, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al (U.S. Pub. 2003/0146742) in view of Asauchi et al (U.S. Pat. 6,431,676).

Nishida et al discloses:

- ***regarding claim 1 and claim 12***, a condition storage section configured and arranged to store an optimal weight and velocity of droplets to be discharged from a discharge head (Paragraph 0093)
- a weight measuring section configured and arranged to measure the weight of the droplets discharged from the discharge head (Paragraph 0156)
- a speed-measuring section configured and arranged to measure the velocity of the droplets discharged from the discharge head (Paragraphs 0007, 0099)
- a basic drive waveform storage section configured and arranged to store a basic drive waveform (Paragraph 0085)
- waveform-adjusting section configured and arranged to read basic drive waveform from the basic drive waveform storage section and adjust the basic drive waveform to an adjusted drive waveform so the weight and velocity substantially match

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the optimal weight and velocity that are stored in the condition storage section for the adjusted drive waveform (Paragraphs 0098 – 0101, 0225)

- **regarding claim 2 and claim 13**, a physical property value acquisition section configured and arranged to acquire physical property values of the droplets discharged from the discharge head (Paragraph 0093)

- adjusted waveform storage section being further configured and arranged to correlate and store the adjusted drive waveforms that are adjusted by the waveform-adjusting section with the physical property values acquired by the physical property value acquisition section (Paragraph 0101)

- **regarding claim 3 and claim 14**, waveform-adjusting section further configured and arranged to correct the basic drive waveform in accordance with a natural period of the discharge head, and adjust the basic drive waveform (Paragraphs 0085, 0098 - 0101)

- **regarding claim 4**, physical property value acquisition section is further configured and arranged to acquire at least one of viscosity, surface tension, contact angle, and density as the physical property values of the droplets (Abstract, Paragraphs 0014)

- **regarding claim 5**, the physical property value acquisition section comprises a measuring section that is configured and arranged to measure at least one of physical property of the droplets (Paragraphs 0011 – 0012, 0072, 0092)

- **further regarding claim 12**, a discharge head with a liquid-filled unit containing a liquid material and configured and arranged to form the liquid material into

droplets; a drive control section (33) configured and arranged to supply a drive waveform to the discharge head to discharge the droplets by expanding or contracting the liquid-filled unit in accordance with the drive waveform; drive control section (33) configured to provide the discharge head with the adjusted drive waveform that is determined by the drive waveform-determining device (Paragraphs 0001 – 0002, 0155, 0160-0162)

- **regarding claim 11 and claim 18**, waveform-adjusting section is further configured and arranged to determine an electric potential V_H and an early electric potential V_C of the basic drive waveform so that the weight and the velocity of the droplets substantially match the values stored in the condition storage section (Paragraphs 0098 – 0101)

Nishida et al does not disclose expressly:

- **regarding claim 1**, adjusted waveform storage section configured and arranged to store the adjusted by the waveform-adjusting section
- **regarding claim 2 and claim 13**, basic drive waveform storage section being further configured and arranged to store a plurality of basic drive waveforms that correspond to the physical property values of the droplets
- the waveform-adjusting section further configured and arranged to read one of the basic drive waveforms from those stored in the basic drive waveform storage section as the adjusted drive waveform that correspond to the physical property values acquired by the physical property value acquisition section

Asauchi et al discloses:

- ***regarding claim 1***, adjusted waveform storage section configured and arranged to store the adjusted by the waveform-adjusting section (Column 4, Lines 12 – 16; Claim 20), for the purpose of generating driving waveforms to actuate driving elements of a print head.

- ***regarding claim 2 and claim 13***, basic drive waveform storage section being further configured and arranged to store a plurality of basic drive waveforms that correspond to the physical property values of the droplets (Column 4, Lines 12 – 16; Claim 20) , for the purpose of generating driving waveforms to actuate driving elements of a print head.

- the waveform-adjusting section further configured and arranged to read one of the basic drive waveforms from those stored in the basic drive waveform storage section as the adjusted drive waveform that correspond to the physical property values acquired by the physical property value acquisition section (Column 2, Lines 30 – 42; Column 4, Lines 12 – 16) , for the purpose of generating driving waveforms to actuate driving elements of a print head.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of adjusted waveform storage section configured and arranged to store the adjusted by the waveform-adjusting section; basic drive waveform storage section being further configured and arranged to store a plurality of basic drive waveforms that correspond to the physical property values of the droplets; the waveform-adjusting section further configured and arranged to read one of the basic drive waveforms from those stored in the basic drive waveform storage

section as the adjusted drive waveform that correspond to the physical property values acquired by the physical property value acquisition section as taught by Asauchi et al into the device of Nishida et al. The motivation for doing so would have been to generate driving waveforms to actuate driving elements of a print head.

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al (U.S. Pub. 2003/046742) as modified by Asauchi et al (U.S. Pat. 6,431,676) as applied to the claim 1 above, and further in view of Umetani et al (U.S. Pub. 2003/0193539)

Nishida et al as modified by Asauchi et al discloses all of the claimed limitations except for the following:

- ***regarding claim 6***, weight measuring section comprises: an electrode configured and arranged to face the discharge head; an oscillator configured and arranged to change frequency in accordance with the weight of a substance deposited on an electrode surface; a frequency counter configured and arranged to measure the frequency of the oscillator; calculating section configured and arranged to calculate the weight of the droplets on the basis of the difference in frequency before and after droplet deposition measured with the aid of the frequency counter
- ***regarding claim 7***, compute a viscosity of the droplets with aid of an amplitude-damping characteristics of the oscillator when the droplets deposit on the electrode surface

Umetani et al discloses:

- **regarding claim 6**, an electrode (22) configured and arranged to face the discharge head (Paragraph 0045; Figure 3); an oscillator configured and arranged to change frequency in accordance with the weight of a substance deposited on an electrode surface (Paragraph 0007; Claim 1); a frequency counter configured and arranged to measure the frequency of the oscillator (Paragraph 0060); calculating section (35) configured and arranged to calculate the weight of the droplets on the basis of the difference in frequency before and after droplet deposition measured with the aid of the frequency counter (Paragraph 0047; Claim 8), for the purpose of measuring the amount of ink ejected from the recording head with high accuracy.

- **regarding claim 7**, compute a viscosity of the droplets with aid of an amplitude-damping characteristics of the oscillator when the droplets deposit on the electrode surface (Paragraphs 0055 – 0056), for the purpose of improving the quality of printing.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of an electrode configured and arranged to face the discharge head; an oscillator configured and arranged to change frequency in accordance with the weight of a substance deposited on an electrode surface; a frequency counter configured and arranged to measure the frequency of the oscillator; calculating section configured and arranged to calculate the weight of the droplets on the basis of the difference in frequency before and after droplet deposition measured with the aid of the frequency counter; compute a viscosity of the droplets with aid of an amplitude-damping characteristics of the oscillator when the droplets deposit

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on the electrode surface as taught by Umetani et al into the device of Nishida et al and Asauchi et al. The motivation for doing so would have been to measure the amount of ink ejected from the recording head with high accuracy, and to improve the quality of printing.

Claim 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al (U.S. Pub. 2003/046742) as modified by Asauchi et al (U.S. Pat. 6,431,676) as applied to claims 1 and 12 respectively above, and further in view of Takahashi et al (U.S. Pub. 2003/0048331)

Nishida et al as modified by Asauchi et al discloses all of the claimed limitations except for the following:

- ***regarding claim 8 and claim 15***, compute the velocity of the droplets by using the position of the droplets discharged from the discharge head at two different points in time, and using the time difference between these two points in time

Takahashi et al discloses

- ***regarding claim 8 and claim 15***, compute the velocity of the droplets by using the position of the droplets discharged from the discharge head at two different points in time, and using the time difference between these two points in time (Paragraph 0117), for the purpose of improving the accuracy and quality of ejected ink.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of computing the velocity of the droplets by using the position of the droplets discharged from the discharge head at

two different points in time, and using the time difference between these two points in time as taught by Takahashi et al into the device of Nishida et al and Asauchi et al. The motivation for doing so would have been to improve the accuracy and quality of ejected ink.

Claim 9, 10, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al (U.S. Pub. 2003/046742) as modified by Asauchi et al (U.S. Pat. 6,431,676) as applied to claims 1 and 12 respectively above, in view of Takahashi et al (U.S. Pub. 2002/0057303) and further in view of Matsuo et al (U.S. Pat. 6,488,349)

Nishida et al as modified by Asauchi et al discloses

- ***regarding claim 9 and claim 16***, waveform-adjusting section is further configured and arranged to measure a variation in the velocity of the droplets from a plurality of nozzles of the discharge head (Nishida et al: Paragraphs 0007, 0099)

Nishida et al as modified by Asauchi et al does not disclose

- ***regarding claim 9 and claim 16***, waveform-adjusting section configured and arranged to change the drive waveform by using at least one of an early electric potential VC, an electric potential VH during expanding a liquid filled unit of the discharge head and an electric potential VL during contracting the liquid-filled unit of the discharge head

- configured and arranged to determine a hold time to maintain the electric potential VH of the basic drive waveform so that the variation is minimal

- **regarding claim 10**, waveform-adjusting section is further configured and arranged to determine a hold time to maintain an electric potential VL of the basic drive waveform so that a decrease in the weight of the droplets in a high frequency region of the basic drive waveform is minimal

Takahashi et al discloses

- **regarding claim 9 and claim 16**, waveform-adjusting section configured and arranged to change the drive waveform by using at least one of an early electric potential VC, an electric potential VH during expanding a liquid filled unit of the discharge head and an electric potential VL during contracting the liquid-filled unit of the discharge head (Paragraph 0088), for the purpose of improving image quality.

Matsuo et al discloses

- **regarding claim 9 and claim 16**, configured and arranged to determine a hold time to maintain the electric potential VH of the basic drive waveform so that the variation is minimal (Column 16, Lines 35 – 48), for the purpose of improving the ink discharging performance of the discharge head.

- **regarding claim 10 and claim 17**, waveform-adjusting section is further configured and arranged to determine a hold time to maintain an electric potential VL of the basic drive waveform so that a decrease in the weight of the droplets in a high frequency region of the basic drive waveform is minimal (Column 16, Lines 35 – 48) , for the purpose of improving the ink discharging performance of the discharge head.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of waveform-adjusting section

configured and arranged to change the drive waveform by using at least one of an early electric potential VC, an electric potential VH during expanding a liquid filled unit of the discharge head and an electric potential VL during contracting the liquid-filled unit of the discharge head; configured and arranged to determine a hold time to maintain the electric potential VH of the basic drive waveform so that the variation is minimal; waveform-adjusting section is further configured and arranged to determine a hold time to maintain an electric potential VL of the basic drive waveform so that a decrease in the weight of the droplets in a high frequency region of the basic drive waveform is minimal as taught by Takahashi et al and Matsuo et al into the device of Nishida et al as modified by Asauchi et al. The motivation for doing so would have been to improve image quality and improve the ink discharging performance of the discharge head.

Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al (U.S. Pub. 2003/0146742) as modified by Asauchi et al (U.S. Pat. 6,431,676) as applied to claim 12 above, and further in view of Nakamura et al (U.S. Pub. 2003/0151637)

Nishida et al as modified by Asauchi et al discloses all of the claimed limitations except for the following:

- ***regarding claim 19***, an electrooptical device manufactured using the droplet discharge
- ***regarding claim 20***, an electronic equipment equipped with an electrooptical device manufactured using the droplet discharge device

Nakamura et al discloses:

- ***regarding claim 19***, an electrooptical device manufactured using the droplet discharge (Abstract, 0002, 0083 – 0084), for the purpose of providing a efficient ejecting method and low cost manufacturing.

- ***regarding claim 20***, an electronic equipment equipped with an electrooptical device manufactured using the droplet discharge device (0083 – 0084) , for the purpose of providing an efficient ejecting method and low cost manufacturing.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate the teaching of an electrooptical device manufactured using the droplet discharge; an electronic equipment equipped with an electrooptical device manufactured using the droplet discharge device as taught by Nakamura et al into the device of Nishida et al as modified by Asauchi et al. The motivation for doing so would have been to provide an efficient ejecting method and low cost manufacturing.

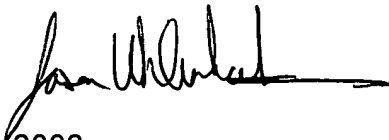
Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Uhlenhake whose telephone number is (571) 272-5916. The examiner can normally be reached on Monday - Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JSU
January 6, 2006



 1/04
K. FEGANS
PRIMARY EXAMINER